GUIDELINE A-8

Guideline for the Implementation of Canada-wide Standards for Emissions of Mercury and of Dioxins and Furans

and

Monitoring and Reporting Requirements

for

Municipal Waste Incinerators

Biomedical Waste Incinerators

Sewage Sludge Incinerators

Hazardous Waste Incinerators

Steel Manufacturing Electric Arc Furnaces

Iron Sintering Plants

Legislative Authority:
Environmental Protection Act, Part V, Section 27, and Part II, Section 9
Ontario Regulation 347, General – Waste Management Regulation
Ontario Regulation 346, General – Air Pollution

Responsible Director:
Director, Standards Development Branch

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SYNOPSIS

This guideline establishes the formal adoption by Ontario of the Canada-wide Standards for emissions of mercury and of dioxins and furans from municipal waste, biomedical waste, sewage sludge and hazardous waste incineration systems in Ontario. This guideline also establishes the formal adoption by Ontario of the Canada-wide Standards for dioxin and furan emissions from steel manufacturing electric arc furnaces and iron sintering plants in Ontario

The Canadian Council of Ministers of the Environment (CCME) announced Canada-wide Standards for emissions of mercury from incineration systems on June 6, 2000 and of dioxins and furans on May 1, 2001. These Canada-wide Standards have been adopted by Ontario and are reflected in this guideline and in an updated Guideline A-7. The CCME also announced Canada-wide Standards for emissions of dioxin and furan from steel manufacturing electric arc furnaces and iron sintering plants on May 1, 2003.

This guideline applies to new and existing incinerators. Effective August 1, 2001, all new incinerators must demonstrate compliance with the mercury the dioxin and furan limits within six (6) months of start-up New steel manufacturing electric arc furnaces and iron sintering plants must comply with the dioxin and furan limits as of May 1, 2003. Existing incinerator, steel manufacturing electric arc furnaces and iron sintering plants will be required to demonstrate compliance through the inclusion of conditions in instruments such as Certificates of Approval at such time as these instruments take effect and prior to the end (December 31) of the years listed as "Compliance Date" for the applicable limits for existing plants.

1.0 INTRODUCTION

This guideline establishes Ontario specific limits for emissions of mercury and of dioxins and furans applicable to four types of waste incinerators through adoption of the June 6, 2000 and May 1, 2001 Canada-wide Standards (www.ccme.ca). These limits will be applied by the ministry when reviewing "Applications for Approval" for new incinerators, upgraded (expanded or modified) incinerators, and for other modifications to existing incinerators as necessary.

This guideline also establishes Ontario dioxin and furan emission limits for steel manufacturing electric arc furnaces and iron sintering plants through adoption of these Canada-wide Standards on May 1, 2003. These limits will be applied by the ministry when reviewing "Applications for Approval" for new steel manufacturing electric arc furnaces and iron sintering plants, upgraded (expanded or modified) steel manufacturing electric arc furnaces and iron sintering plants (May 1, 2003), or for other modifications to existing steel manufacturing electric arc furnaces and iron sintering plants as appropriate.

A waste incinerator will be considered to be upgraded (expanded or modified) if, as a result of changes, the approved or rated waste throughput increases, the approved or rated heat input to the unit increases by any amount or if the emissions are predicted to substantially increase for any other reason in relation to changes proposed in an application made by the plant owner/operator. A steel manufacturing electric arc furnace will be considered to be upgraded (expanded or modified) if there is a complete replacement of the EAF or of the gas conditioning system, or if there is a cumulative 25 percent or more increase in the hourly steel production from the maximum hourly steel production rate achieved in the 5 years prior to May 1, 2003 through physical modifications to the EAF facility. An iron sintering plant will be considered to be upgraded (expanded or modified) if there is a complete replacement of the sintering machine or of the gas conditioning system, or if there is a cumulative 25 percent or more increase in the hourly sintering capacity from the sintering capacity existing as of May 1, 2003 achieved through physical modifications to the iron sintering plant.

This guideline supplements the requirements of Regulation 346 (RRO 1990), General – Air Pollution, including compliance with the point of impingement standards prescribed in Schedule 1 to that regulation. This guideline complements Guideline A-7 which applies to new municipal waste incinerators and Guideline A-1 which applies to all biomedical waste incinerators operating in the Province of Ontario as of December 6, 2003 (one year after O. Reg. 323/02 took effect).

2.0 GUIDELINE LIMITS

2.1 Mercury

New, upgraded and existing waste incinerators, with the exception of existing "small" biomedical waste incinerators, shall meet the in-stack emission limits for mercury as set out in Table 1, below:

TABLE 1: MERCURY EMISSION LIMITS

Incinerator Type	Emission Limit	Compliance Date		Comments
		New or upgraded	Existing	
Municipal Waste	20 μg/Rm^3 **	June 7, 2000	2006	calculated as the arithmetic average of 3 stack tests
Biomedical Waste*	20 μg/Rm^3	June 7, 2000	2006	calculated as the arithmetic average of 3 stack tests
Hazardous Waste	50 μg/Rm^3	June 7, 2000	2003	calculated as the arithmetic average of 3 stack tests
Sewage Sludge	70 μg/Rm^3	June 7, 2000	2005	calculated as the arithmetic average of 3 stack tests

* Variation from the Canada-wide Standard for mercury, which differentiates between "Large" and "Small" units using a throughput capacity of 120 tonnes per year as the boundary between these two sizes and allows for the use of "determined efforts" to meet the CWS (see section 2.3).

** µg/Rm^3 means micrograms per reference cubic metre at 25°C and 101.3 kilopascals pressure. Concentrations are also to be corrected to 11 percent oxygen and zero percent moisture (dry) for reporting and compliance purposes.

2.2 Dioxins and Furans

New, upgraded and existing waste incinerators, with the exception of existing "small" biomedical waste incinerators, shall meet the in-stack emission limits for dioxins and furans as set out in Table 2, below:

TABLE 2: DIOXIN AND FURAN EMISSION LIMITS

Facility Type	Emission Limit	Compliance Date		Comments
		New or upgraded	Existing	
Municipal Waste Incinerator	80 pg I-TEQ/Rm^3 **	May 2, 2001	2006	calculated as the arithmetic average of 3 stack tests
Biomedical Waste Incinerator*	80 pg I-TEQ/Rm^3	May 2, 2001	2006	calculated as the arithmetic average of 3 stack tests
Hazardous Waste Incinerator	80 pg I-TEQ/Rm^3	May 2, 2001	2006	calculated as the arithmetic average of 3 stack tests
Sewage Sludge Incinerator	80 pg I-TEQ/Rm^3 100 pg I-TEQ/Rm^3	May 2, 2001 NA	NA 2005	calculated as the arithmetic average of 3 stack tests
Steel Manufacturing Electric Arc Furnace	150 pg I-TEQ/Rm^3 100 pg I-TEQ/Rm^3	NA May 1, 2003	2006 2010	calculated as the arithmetic average of 3 stack tests
Iron Sintering Plant	1350 pg I-TEQ/Rm^3 500 pg I-TEQ/Rm^3 200 pg I-TEQ/Rm^3	NA NA May 1, 2003	2002 2005 2010	calculated as the arithmetic average of 3 stack tests

* Variation from the Canada-wide Standard for dioxins and furans, which differentiates between "Large" and "Small" units using a throughput capacity of 26 tonnes per year as the boundary between these two sizes and allows for the use of "determined efforts" to meet the CWS (see section 2.3).

** pg I-TEQ/Rm^3 means picograms of toxicity equivalents (calculated using the toxicity equivalence factors recommended by the North Atlantic Treaty Organizations's Committee on Challenges to Modern Society [NATO/CCMS] in 1989 and adopted by Canada in 1990) to 2,3,7,8 tetrachloro dibenzo-*p*-dioxin per reference cubic metre at 25°C and 101.3 kilopascals pressure. Concentrations are also to be corrected to 11 percent oxygen and zero percent moisture (dry) for reporting and compliance purposes for incinerators. Concentrations are also to be corrected to zero percent moisture (dry), but do not need to be corrected for oxygen for reporting and compliance purposes for EAF and iron sintering plants.

2.3 Guideline Limits for Small Biomedical Waste Incinerators

Since the Canada-wide Standards for mercury and for dioxins and furans were published, Ontario has developed a revised Guideline A-1 for biomedical waste incinerators (October 2002). The requirements of that document supercede the provisions of the Canada-wide Standards and require biomedical waste incinerators of any size to meet the same emission limits for mercury and for dioxins and furans as those set for "large" units under the Canada-wide Standards.

2.4 Guideline A-7: Combustion and Air Pollution Control Requirements for New Municipal Waste Incinerators

Guideline A-7 has been amended (October 2002) to incorporate the new dioxin and furan emission limit of 80 pg I-TEQ/Rm^3 as well as the new mercury emission limit of 20 $\mu g/Rm^3$ incorporated in September 2000.

3.0 COMPLIANCE TESTING

Within six months of start-up, all new or upgraded incinerator units, regardless of size, shall determine and demonstrate compliance with the limits set out in Tables 1 and 2 through source emissions testing, performed under maximum operating feed rates in accordance with the methods and procedures documented in the Ontario Source Testing Code. Thereafter, testing shall be performed once in each calendar year (annually).

Existing incinerators shall determine compliance with the limits set out in Tables 1 and 2 and existing steel manufacturing electric arc fumaces and iron sintering plants shall determine compliance with the limits set out in Table 2 through source emissions testing, performed under maximum operating feed rates in accordance with the methods and procedures documented in the Ontario Source Testing Code, within 6 months after the compliance date set out in Tables 1 and 2 as required by the appropriate legal instrument utilized to ensure compliance. Thereafter, testing shall be performed once in each calendar year (annually).

Additional source emissions testing may be required by the Director if recurring mercury or dioxin and furan emission problems occur with an operating incinerator, steel manufacturing electric arc furnace or iron sintering plant either in the context of reviewing and evaluating the CWS or this guideline, or with respect to compliance with a legal instrument enforcing compliance.

Source emissions testing for mercury shall be conducted using a method that permits the speciation of mercury present in emissions such as the Ontario Hydro method.

Source emissions testing for dioxin and furan shall be conducted using Environment Canada Methods 1/RM/2 and 1/RM/23 or US EPA Method 23, determining emissions of all of the contaminants for which Toxic Equivalency Factors (TEFs) have been established by

NATO/CCMS, and results expressed as I-TEQ using the NATO/CCMS TEFs. Compliance will be determined based on measured I-TEQ emission levels. Table 3 provides a listing of the contaminants involved, and the TEFs assigned to each contaminant.

In determining I-TEQ emission levels, where the analytical results indicate that the amount of a particular isomer of dioxin and furan, is less than the detection limit reported by the laboratory analyzing the source emission testing samples the amount of dioxin and furan shall be reported as the toxic equivalent concentration (I-TEQ) by using the reported detection limit as the amount present for that isomer. The reported detection limits are to be determined by the laboratory at the time the source emission testing samples are analyzed based on analysis of appropriate replicate low level samples or blanks. If the annual source emissions testing indicates that the concentration of dioxin and furan has remained consistently below 32 pg/Rm^3 as I-TEQ for five (5) consecutive years, then the source operator/owner may exclude dioxin and furan from the annual source emissions testing every second year as long as the concentration of dioxin and furan continues to remain below 32 pg/Rm^3 as I-TEQ.

TABLE 3: Toxic Equivalency Factors (TEFs)

Congener	**NATO/CCMS (1989)**
PCDDs	
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	0.5
1,2,3,4,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
1,2,3,4,6,7,8,9-OCDD	0.001
PCDFs	
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.05
2,3,4,7,8-PeCDF	0.5
1,2,3,4,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1

1,2,3,6,7,8-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
1,2,3,4,6,7,8,9-OCDF	0.001

3.1 Pollution Prevention for Biomedical Waste Incinerators

The operators of all sources affected by the Canada-wide Standards are encouraged to use pollution prevention strategies to meet or exceed the emission limits set in the Canada-wide Standards. However, in the case of biomedical waste incineration there are significant opportunities for emission reductions due to the adoption of such strategies.

In particular, operators should consider implementing mercury reduction plans including periodic mercury audits conducted after implementation of such plans. The results of the audits should evaluate measures taken such as staff training and education in the waste source/generating locations and an audit of the purchases and fate of mercury containing devices, articles and materials, including waste mercury amalgams, fluorescent lamps, switches and temperature control devices, etc.

Similarly, operators are encouraged to develop a dioxin and furan pollution prevention plan including a detailed waste input audit and a rationale describing the expected emission levels which would have been expected from wastes excluded from firing to the unit as part of the implementation of the plan.

Any pollution prevention efforts made by operators to meet the standards through means other than "bottom of stack" control measures should be documented and should include consideration of programs/initiatives for eliminating the use of mercury-containing products where such products can enter an incinerator waste feed stream, or diverting mercury-containing wastes from the incinerator feed as well as measures taken to prevent emissions of dioxins and furans (e.g., documentation that the unit is used solely for destruction of pathological and/or cytotoxic wastes). Documentation of the effectiveness of determined efforts should include a sound estimate of the expected emissions from the facility resulting from the implementation of these measures, including a detailed rationale for the magnitude of those estimated emissions.

4.0 REPORTING

A report on any source emissions testing performed in accordance with the requirements under section 3.0, shall be forwarded in triplicate to the ministry's local district office within 90 days of completion of the testing. The report shall be in the format specified in the Source Testing Code, and shall include, but not be limited to:

(1) an executive summary;

(2) dates when source emissions testing was carried out;

(3) process description, records of waste composition and feed rate during the source measurement;

(4) records of operating conditions, including but not limited to:

  (1) records of all continuous emission monitoring systems, including temperature and pressure sensors, for the period when the source emission testing was taking place;

  (2) liquid and/or reagent and gas flow rates for all components of the air pollution control system;

  (3) any other records that may affect the evaluation of the source emissions testing report;

(5) procedures followed during the source emissions testing and any deviation from the proposed test protocol and the reasons therefore;

(6) the results of the analyses of the stack emissions;

(7) a summary table that compares the source emissions testing results, the monitoring data and the records of operating conditions during the source emissions testing to the requirements imposed by the Environmental Protection Act, Regulation 346 and this Guideline and which presents the estimated annual loadings of mercury and dioxins and furans (expressed as I-TEQ) from the source calculated using procedures consistent with currently accepted practices used to report emissions as required by O. Reg. 127/00.